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XVIII.—OSMANTHUS AQUIFOLIUM AND O. FORTUNEI.

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For a long time two plants have been in cultivation under the name of *Osmanthus Aquifolium*. Horticulturists have been aware of it, and twice an attempt has been made to discriminate between them and to define them technically, but with so little success that no notice was taken of it in systematic and floral works. This was no doubt due to the fact that the distinctions relied upon were taken from the leaf characters which by most authors were considered as extremely variable, and therefore unsuitable. Although a considerable variability in size, shape and degree of dentation of the leaves cannot be denied, there are limits to it which allow us to recognise two types of leaves which are moreover constantly correlated with floral characters, and in this way make it possible to distinguish two well-defined units within what is commonly called *Osmanthus Aquifolium*.

The name *Osmanthus Aquifolium* appears for the first time in Siebold and Zuccarini, "Florae Japonicae Familiae Naturales," sect. alt. (1846) p. 42, as a synonym of *Olea Aquifolium*, Sieb. and Zucc., the paragraph running thus:—"*Ilex Aquifolium*, Thunb. Fl. Jap. p. 79. *Il. Aquif.* var. *heterophylla*, Ait.? Blume Bijdr. p. 1150.—Koo Kotz vulgo Firaggi, Kämpf. Amoen. p. 781.—*Olea ilicifolia* Hasskarl in Catal. hort. Bogor. p. 118.—*Osmanthus Aquifolium* Sieb. in litt." All these synonyms refer to the plant generally known in Japan as "Firagi" or "Hiragi." The excellent figure of it in Honzo Zufu (1828), vol. 88, fol. 1, leaves no doubt as to what this "Hiragi" is. It has elliptic to oblong-elliptic or lanceolate-elliptic leaves with mostly 3—or sometimes 1 or 2 or 4—large spinescent teeth on each side, and they are commonly 4–5 cm. long and 2·5 cm. wide. Occasionally the leaves are quite entire, and then frequently more lanceolate. The teeth vary from 0·5 to 1 cm. in length. The flowers measure about 8–9 mm. in diameter, the calyx segments are ovate, and subobtuse to almost acute, the petals oblong, 4–5 mm. by 2–2·5 mm., the filaments more than half the length of the petals, and distinctly

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longer than the anthers, the whole stamens almost equalling the petals in length, and the capitate stigma, which is borne on a slender style, stands over 3 mm. from the base of the flower. Beside these hermaphrodite flowers, there occur also male flowers in which the pistil is reduced to a short conical body, shortly exserted from the calyx and terminating in a more or less bifid point, whilst the anthers are somewhat longer, so that their tips reach or protrude beyond those of the petals. The two types of flowers are found in separate individuals to judge from the herbarium material, but it is probable that this separation is actually not so absolute, and that among the apparently hermaphrodite flowers functionally female ones also occur. An imperfect diclinism of this kind is not uncommon in *Oleaceae*. A very good figure of *Osmanthus Aquifolium*, as defined here, may be found in Shirasawa's Iconographie des Essences Forestières, vol. i, tab. 82.

The plant was in cultivation in Buitenzorg in the twenties of the last century according to Blume (l.c.), but does not seem to have found its way into Europe until 1856, when T. Lobb introduced it from Japan for Messrs. Veitch & Sons, who advertised it in 1858 as *Olea ilicifolia* (Gard. Chron. 1858, p. 419, advert.; Veitch, Hort. Veitch, p. 404). This disposes of Bretschneider's statement that the plant was introduced by Fortune, in so far as the true *Osmanthus Aquifolium* and Fortune's claim to having it introduced into Europe for the first time is concerned; but Fortune no doubt saw it in Japan in 1860, and brought specimens with him to England in 1862. There is a sample of it in the Kew Herbarium, collected by him in gardens at Yedo in November, 1860, and plants of the variegated form imported by him for Standish were exhibited by that firm in the summer of 1862 (Gard. Chron. 1862, p. 240).

It appears, however, that Fortune also brought with him another *Osmanthus* which he himself had apparently not recognised as distinct from *O. Aquifolium*, and which under that name was distributed from the English nurseries. A plant of it came into Carrière's hands, and he at once pointed out that it was a new and distinct species which he named *O. Fortunei* (Rev. Hort. 1864, pp. 69–71 with fig.). Carrière said that Fortune brought it from China, and a specimen in the Hookerian collection at Kew, received from "Hort.-Veitch" and described as "e China" seems to confirm his statement. But as we now know that *O. Fortunei* is also cultivated in Japan, and Fortune took his collection of living Japanese plants home viâ China, and furthermore, as *O. Fortunei* has not since been observed in China, he may very well have got it from a garden in Japan.

The differential characters of *O. Fortunei*, which is only known in the male state, rest on the leaves as well as the flowers, and may be diagnosed as follows :—

Leaves elliptic, usually with numerous (8–12) pungent teeth on each side, occasionally entire or with a very few small teeth, and commonly 7–10 cm. long, 4–7 cm. wide; teeth 0·3–0·5 cm. long. *Flowers* about 7 mm. in diameter. *Calyx* segments rotundate, truncate, the hyaline margin minutely erosulate. *Corolla* segments obovate-oblong, 3 mm. long, 2 mm. wide. *Filaments* as long as or rather shorter than the anthers, the whole stamen distinctly

shorter than the petal. *Rudimentary pistil* conical, slightly exceeding the calyx, the pointed apex shortly bifid. *Ovules* present, but never developing.

Although Carrière's description and figures ought to have been sufficient to keep the two plants distinct, they were sold and grown indiscriminately as *Osmanthus Aquifolium* or *O. ilicifolius*. In 1876, a good figure of *O. Fortunei* was published in the Gardeners' Chronicle of Nov. 25 (p. 689), accompanied by analyses of the flower, showing clearly the erosulate truncate calyx segments, the short filaments and the rudimentary pistil, but the name applied to it was *Osmanthus Aquifolium* with the synonyms *Osmanthus ilicifolius* and *Olea ilicifolia*. In the following year, however, the correct appellation of the plant having been challenged, the figure was reproduced in the Gardeners' Chronicle (Feb. 24, p. 239) and the synonymy was rectified in so far as *Olea ilicifolia* was retained as a synonym, whilst *Osmanthus ilicifolius* of the nurseries was proposed to stand "for garden purposes" as a name for the "more deeply cut form" which "botanists will with greater propriety call . . . *Osmanthus Aquifolium* var. *ilicifolius*." A figure was added of a leaf of the latter which makes it perfectly clear that this *O. ilicifolius* is the 'Hiragi' of Japan, that is the genuine *O. Aquifolium*. Yet the authors of the note themselves thought so little of those "forms" that they considered it doubtful whether botanists "would think it worth while to keep up such a variety," and in another passage actually say that "the so-called *O. ilicifolius* is the same as *O. Aquifolium*," adding "that in the wild plant it is easy to pick leaves of both so-called species from the same bough." There is no justification for this statement so far as herbarium specimens go, nor is there any evidence that either Lobb or Fortune, who might have supplied the information, ever collected those species of *Osmanthus* in the wild state. In fact, *O. Fortunei* is still unknown in that state, and *O. Aquifolium* is so generally cultivated in Japan, and apt to run wild, that even Japanese botanists were until recently doubtful as to its spontaneous occurrence. Further, the authors themselves admit that "in British gardens the two plants maintain their distinctive characters, and do not as yet manifest any such sporting tendency as we have mentioned." Nor have they done so since, and in so far there would seem to be no reason why *Osmanthus Aquifolium* and *O. Fortunei* should be treated otherwise than as distinct species. Subsequently the figure of *O. Fortunei* published in the Gardeners' Chronicle (sub *O. Aquifolium*) was reproduced in Regel's Gartenflora (1879), p. 276, and in Dippel's Laubholzkunde, vol. i. (1889), p. 140, under *Olea aquifolia*, but no new information was added.

Some fresh light is thrown on the origin of *O. Fortunei* by an observation by Makino concerning *O. japonicus*. Of this Makino (Bot. Mag. Tokyo, vol. xvi., 1902, p. 31) says "= ? *O. Aquifolium* × *fragrans*" and after a very full description of the plant, again on p. 32 "This may be the hybrid between *Osmanthus Aquifolium*, Sieb. and *O. fragrans*, Lour., as given above, having leaves and flowers which are just intermediate to them. It is only known in cultivation." Now this *O. japonicus* is the *O. Fortunei* of Carrière. That this is so is evident from the description

Makino gives of *O. japonicus*, which he also says is only known in the male state, and from the fact that when in a later paper (Bot. Mag. Tokyo, vol. xxiii., 1909, p. 14) reducing *O. japonicus* to a var. of *O. Aquifolium*, he quotes the figures in Regel's Gartenflora (1879), p. 276, and Dippel's Laubholzk., vol. i. p. 140, as representing this plant. Those figures, however, are, as has already been pointed out above, actually figures of *O. Fortunei*. So far as the morphological characters of *O. Fortunei* are concerned, much may be said in favour of the hypothesis of its hybrid origin, although it cannot be considered as proved until the same plant is actually produced by crossing the two assumed parents, which should be easy enough; or until it is found growing among them in a natural state, and under conditions which are equivalent to an experimental proof.

Some support of Makino's theory might also be deduced from the Japanese names of the species involved, *O. Aquifolium* being "Hiragi," *O. fragrans* "Mokusei" and *O. Fortunei* "Hiragi-Mokusei."

Makino, as has been stated above, treated *O. japonicus* in a later paper as a variety of *O. Aquifolium*, but as he does not give any reasons for doing so, it may be sufficient to refer here to what has been said above regarding the differences between *O. Aquifolium* and *O. Fortunei*, and to distinguish them under those names whether the latter should in the end prove to be a hybrid or not. The use of the name *O. Fortunei*, which is not referred to by Makino, in the place of *O. japonicus* requires some explanation. *Osmanthus japonicus* was mentioned first by Siebold in his Synopsis Plantarum Oecon. Regni Japonici [in Verh. Batav. Gen., vol. xii., 1830, p. 36]. It appears there merely as a name for some tree which is much valued in Japan on account of its wood and fragrant flowers and known there as "Hiraki-mok'sen." Then we have it again as a mere name in Hasskarl's Catalogue Pl. Hort. Bogor (1844), p. 118 in the version "*Olea japonica* Sbld. (sub *Osmantkus*) Hiraki-mok'sen, and again as "*Olea japonica*" in Siebold & Zuccarini Florae Japonicae Familiae Naturales in Abh. Akad. Münch., vol. iv. 3, p. 176 (p. 43 of the reprint). The first description of it is Makino's in 1902, who quotes Hiragi-mokusei (evidently the correct translation of the Hiraki-mok'sen of Siebold) as its vernacular name. *O. Fortunei* (1864) has therefore undoubted priority. Other names which were used in connection with *Osmanthus Aquifolium* are "*Ilex Aquifolium* v. *heterophylla Ait.*," quoted with a ? by Blume, Bijdr., p. 1150 and *Ilex heterophylla*, Don. Gen. Syst. ii. p. 17 (1832). As to the first, Aiton's var. *heterophylla* of *Ilex Aquifolium* was a true *Ilex Aquifolium*, and as to the other, it was a mere book-species formed under the impression that Blume's plant was an *Ilex* which deserved specific rank, whereas Blume actually described an *Osmanthus*, but suggested, as we now know erroneously, that it might be Aiton's *Ilex Aquifolium* var. *heterophylla*. The accompanying plate is intended to bring out the essential characters by which *O. Aquifolium* and *O. Fortunei* may be distinguished, and also the intermediate position of the latter between *O. Aquifolium* and *O. fragrans*.

Cultural Notes.

Mr. Bean has supplied a few notes as to the culture and general habits of the plants under discussion.

Osmanthus Aquifolium is a very useful hardy evergreen, forming a rounded bush up to 8 feet in height, and as much in diameter. With the general aspect of a small-leaved holly, it is of more graceful form and, from its dwarfer habit, is better adapted for positions where space is restricted. It has produced under cultivation several variegated forms, but the best of its varieties is *atropurpureus* ; this was raised at Kew in the "seventies" of last century. The whole shrub has a purple tinge, and the quite young twigs and leaves in their black shininess have the aspect of having been dipped in tar. It is, in our experience, the hardiest of all the forms.

Dr. Stapf observes that the leaves of the species are occasionally entire. Such leaves occur on all plants that are old enough ; they are characteristic (as in the holly) of the adult condition, but they only occur on the upper part of the shrub. Twigs, taken off and rooted, remain constant and make neat bushes ; they are sold by nurserymen as *O. myrtifolius*. All the forms flower in autumn and their clustered, small, white flowers are very fragrant. Propagation is best effected by means of cuttings in late summer, giving them mild bottom heat. The practice of grafting this shrub on the oval-leaved privet is unnecessary and objectionable.

O. Fortunei, as might be inferred from the supposed parentage given above, is not quite so hardy as *O. Aquifolium*, for one of the parents (*O. fragrans*) is a cool greenhouse shrub. It has, nevertheless, survived over 30° of frost at Kew, and although the trying winter of 1908–9 denuded our plants of all their leaves, the same happened to holm oaks and other evergreens, and, as with them, the *Osmanthus* quite recovered in the following summer. It can be increased by cuttings like *O. Aquifolium*, but does not strike root so readily. All the forms like a good open loamy soil, and thrive best in a sunny sheltered position.

Explanation of Plate.

A. *Osmanthus Aquifolium*. 1, leaf ; 2, hermaphrodite flower ; 3, calyx and pistil of same ; 4, male flower ; 5, calyx and rudimentary pistil of same. B. *O. Fortunei*. 6, leaf ; 7, male flower ; 8, calyx and rudimentary pistil of same. C. *O. fragrans*. 9, leaf (dentate state) ; 10, hermaphrodite flower ; 11, calyx and pistil of same ; 12, male flower ; 13, calyx and rudimentary pistil of same.

XIX.—DIAGNOSES AFRICANAE : XLI.

1251. Loranthus (Ischnanthus) triplinervius, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 385, anglice, ined. [Loranthaceae - Eulorantheae] ; affinis *L. Holstii*, Engl., a quo foliis triplinerviis, umbellis 4–6-floris recedit.

Ramuli graciles, glabri, dense lenticellati, purpureo-brunnei vel pallidi. *Folia* opposita, subsessilia vel breviter petiolata, lanceolata vel elliptico-lanceolata, recta vel subarcuata, apice obtusissima vel subacuta, basi cuneata, 3·2–4·4 cm. longa, 0·8–1·6 cm. lata, chartacea, glabra, paullo supra basin distincte trinervia ; petioli usque ad 2 mm. longi, glabri. *Umbellae* solitariae, 4–6-florae ; pedunculus 1·5–2 mm. longus, glaber ; pedicelli 3 mm. longi, glabri ; bractea e basi cupulari elliptica, ciliata, extus glabra, margine dorsali 1·3 mm. longo inferne umbonato, margine ventrali 0·25–0·35 mm. longo. *Torus* circiter 1 mm. longus. *Calyx* subtruncatus, ciliatus, 0·35 mm. longus. *Corolla* pallide viridis, vix 1·2 cm. longa, in alabastro tetragona ; tubus 3 mm. longus ; lobi lineares, sursum ampliati, 7 mm. longi. *Filamenta* basi corollae loborum inserta, 4·5 mm. longa, linearia, dente 0·13–0·17 mm. longo ; antherae lineares, 3 mm. longae. *Discus* leviter obtuse 4-lobatus, 0·4 mm. altus.

Tropical Africa. German East Africa : Dar-es-Salam, *Kirk ; Holtz*, 553 ; *Stuhlmann*, 7614, 7666, 7667, 7673, 7790.

1252. **Loranthus (Ischnanthus) ramulosus**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 386, anglice, ined. [Loranthaceae-Eulorantheae] ; affinis *L. Schlechteri*, Engl., a quo antheris longioribus recedit.

Planta ramosa, ramulis brevibus juventute minute puberulis demum glabris. *Folia* opposita, suborbicularia, elliptica, elliptico-oblonga vel lanceolata, apice obtusa vel subacuta, basi obtusa vel rotundata, 0·6–2·5 cm. longa, 5–9 mm. lata, tenuiter coriacea, glabra ; nervi laterales valde obliqui, utrinque 2–3 ; petioli 0·5–1 mm. longi. *Umbellae* solitariae, 4-florae ; pedunculus 2–2·5 mm. longus, apice excepto glaber ; pedicelli 2–2·5 mm. longi, tetragoni, glabri, in cavis paullo profundis ciliatis inserti ; bractea torum calycecum aequans, e basi cupulari anguste ovata, ciliata, extus sparse pilosa, margine dorsali 1·5 mm. longo, margine ventrali 0·4 mm. longo. *Torus* 1–1·3 mm. longus. *Calyx* subtruncatus, ciliatus, 0·25–0·35 mm. longus. *Corolla* 2–2·2 cm. longa, in alabastro tetragona ; tubus oblongus, 4·3 mm. longus, haud fissus, papillarum vitta angusta a sinibus decurrente ; lobi 1·7 cm. longi, lineares, sursum ampliati, infra $\frac{1}{3}$ reflexi. *Filamenta* basi corollae loborum inserta, 8–9 mm. longa, sursum angustata, in basin valde ampliata, inferne leviter sulcata, basi minute papillata, dente subulato 0·8–1 mm. longo ; antherae lineares, 6–7 mm. longae. *Discus* leviter 4-lobatus, 0·35 mm. altus.

Tropical Africa. British East Africa : between Mombasa and Takaunga, *Whyte* ; between Mombasa and Lamu, *Whyte*.

1253. **Viscum (Ploionixia) decurrens**, *Baker et Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 398, anglice, ined. [Loranthaceae-Visceae] ; species perdistincta internodiis superioribus conspicue applanatis ex apice ad basin angustatis, cymulis pedunculatis, petalis deciduis, bacca sessili.

Caulis teres, circiter 4 mm. diametro 23–37 cm. infra apicem ramulorum ; rami biangulati, plus minusve compressi ; ramuli valde compressi internodiis linearibus deorsum leviter angustatis ; internodia 2·5–5·5 cm. longa. *Folia* subsessilia, anguste obovata vel obovato-oblonga usque oblanceolata, apice rotundata, in basin

anguste cuneata, 2–5 cm. longa, 0·8–2 cm. lata, coriacea, glabra, distincte 3-nervia vel 5-nervia, subtiliter reticulata, nitidula ; petioli usque ad 2 mm. longi. *Cymulae* axillares et terminales, solitariae vel ternatae, pedunculatae, 3-florae, unisexuales. *Flores* monoici, tetrameri. *Cymula mascula* :—*Pedunculus* usque ad 3·5 mm. longus, circiter 0·5 mm. ultra cupulam bractealem productus. *Cupula bractealis* cymbiformis, 2·5 mm. longa, utrinque subapiculata. *Alabastra* ellipsoidea, 1·5 mm. longa. *Flos* 1·8 mm. longus, basi solida 0·35 mm. longa. *Torus* circiter 0·35 mm. longus. *Petala* ovata, circiter 1 mm. longa, 0·8–1 mm. lata. *Antherae* suborbiculares, 0·5 mm. diametro, vel ellipticae, 0·8 mm. longae, 0·5 mm. latae. *Cymula feminea* :—*Pedunculus* 4–6 mm. longus, ultra cupulam bractealem plus minusve productus. *Cupula bractealis* minute ciliata, utrinque acuta, tandem crescentiformis lateraliter visa. *Torus* subcylindricus, in basin leviter angustatus, 1·5 mm. longus, vix 1 mm. diametro, vel compressus, 1 mm. latus, 0·8 mm. crassus, laevis. *Petala* ovato-oblonga vel deltoideo-ovata, 0·7 mm. longa, 0·5–0·7 mm. lata. *Stigma* supra insertionem petalorum 0·25–0·3 mm. prominens. *Bacca* juvenilis oblongo-ellipsoidea.— *V. obscurum*, var. *decurrens*, Engl. in Engl. Jahrb. xx. 132 ; De Wild. Études Fl. Bas- et Moyen-Congo, i. 30, 237.

Tropical Africa. Lagos : Eppah, on Guttiferae, *Barter*, 3314. Southern Nigeria : by the Old Calabar River, on *Symphonia globulifera*, Linn. f., *Mann*, 2278. Gaboon : Munda ; Sibange Farm, *Dinklage*, 574 ; by the Gaboon River, on *Symphonia globulifera*, Linn. f., *Mann*, 984. Lower Congo : near Léopoldville, *Gillet*.

V. decurrens is apparently allied to *V. nervosum*, Hochst. *V. obscurum*, Thunb., a native of South Africa, has a sessile inflorescence and long-pedicelled berries.

1254. **Viscum (Aspidixia) ugandense**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 405, anglice, ined. [Loranthaceae-Visceae] ; affinis *V. Engleri*, Van Tiegh., et *V. combreticolae*, Engl., ab hoc forma cupulae bractealis, ab illo bacca sessili distinguitur.

Frutex multiramosus. *Rami* ramulique conspicue applanati, in sicco costati ; internodia linearia usque oblanceolata, taeniiformia, superne latiora, apice leviter constricta, in basin leviter angustata, 1·6–5 cm. longa, 3–7 mm. lata, ea ramorum principalium secus lineam mediam valde incrassata. *Flores* dioici, tetrameri. *Inflorescentiae masculae* ex cymulis tribus trifloris (rarius bifloris) cupulis bractealibus suffultis constantes. *Cupula bractealis* sessilis, late alveata, 3·5 mm. longa, 1·8 mm. lata ; lobi patuli, rotundati, 1·8 mm. longi. *Flos* basi solida 0·25 mm. longa. *Torus* 1·3 mm. longus. *Petala* deltoideo-ovata, 1·3 mm. longa, 1·2–1·4 mm. lata, apice leviter recurva. *Antherae* ambitu elliptico-oblongae, 1·3–1·5 mm. longae, 0·7–0·8 mm. latae. *Inflorescentiae femineae* ex floribus 1 vel 3 cupulis bractealibus suffultis constantes. *Cupula bractealis* conspicue biloba, 1·8–2 mm. alta ; lobi ascendentes vel suberecti, 1 mm. longi, sub anthesi torum superantes vel subaequantes. *Torus* obovoideo-oblongus, 1·3 mm. longus. *Petala* 1·3 mm. longa, decidua, alia anguste triangularia, acuta, 0·8 mm. lata, alia deltoideo-ovata, 1 mm. lata. *Stigma* subsessile, 0·35–0·5 mm. supra insertionem petalorum prominens. *Bacca* sessilis, late ovoidea, 6 mm. longa, laevis.—— *V. dichotomum*, Engl. Pflanzenw. Ost-Afr. C. p. 167 ; Rendle in Journ. Linn. Soc. Bot. vol. xxxvii. p. 207 ; non D. Don.

Tropical Africa. Uganda : Butumbi, 1900 m., *Stuhlmann*, 2179; Toro District, at 1350 m., on *Albizzia Brownii*, Walp., *Dawe*, 473 ; near Fort Portal, 1500 m., *Bagshawe*, 1094 ; Ruchigga, *Bagshawe*, 433.

The type of *V. ugandense* is *Dawe*, 473, from which the description of the female inflorescence and fruit has been drawn up. The male inflorescence has been described from *Bagshawe*, 1094, which comes from the same district and is apparently conspecific.

1255. **Viscum (Aspidixia) shirense**, *Sprague* in Dyer, Fl. Trop. Afr. vol. vi. sect. 1, p. 406, anglice, ined. [Loranthaceae-Visceae] ; affinis *V. Engleri*, Van Tiegh., a quo internodiis angustis apice vix contractis recedit.

Frutex multiramosus. *Caulis* teres, circiter 5 mm. diametro 45 cm. infra apicem ramulorum. *Rami* ramulique conspicue applanati, in sicco costati; internodia late linearia vel oblanceolato-linearia, rarius oblonga, taeniiformia, superne latiora, apice vix vel haud contracta, in basin plus minusve angustata, 1·2–3·7 cm. longa, 2–4·5 mm. lata, ea ramorum principalium secus lineam mediam valde incrassata. *Flores* dioici, tetrameri. *Inflorescentia mascula* :— *Flores* solitarii, sessiles. *Alabastra* ellipsoidea, 2·5 mm. longa, basi solida 0·5 mm. longa. *Torus* 0·8–1 mm. longus. *Petala* deltoideo-ovata, 1–1·3 mm. longa. *Antherae* obtuse trigonae, ambitu ellipticae, 1–1·3 mm. longae, 0·8 mm. latae. *Inflorescentiae femineae* ex floribus 1 vel 3 saepius cupulis bractealibus carentibus constantes. *Cupula bractealis*, dum adsit, sub anthesi basin tantum tori amplectens, sessilis, biloba, 1–1·3 mm. alta, 1·3 mm. longa ; lobi ascendentes, obtusissimi, 0·8 mm. longi. *Torus* pedicellocum obovoideo-oblongus, 1·8–2 mm. longus, 1·3 mm. latus. *Petala* luteo-viridia, oblongo-ovata, 1·3–1·5 mm. longa, 0·8–1 mm. lata, decidua. *Stylus* distinctus, brevis, crassus, compresso-quadrangularis ; stigma 0·8–1 mm. supra insertionem petalorum prominens. *Bacca* juvenilis pedicellata, aurantiaco-rubra, ovoidea.— *V. anceps*, Engl. in Engl. Jahrb. vol. xxx. p. 305, non E. Mey.

Tropical Africa. German East Africa : Unyika ; near Manyames Dorf, 1500 m., *Goetze* 1441. Nyasaland ; Mount Malosa, 1200–1800 m., *Whyte*; near Mambane, 1200 m., *Kirk*. Portuguese East Africa : Gazaland ; Mossurize District, Mafusi, 1000 m., *W. H. Johnson*, 166 ; Mount Maruma, 1000 m., on *Albizzia*, etc., *Swynnerton*, 1085.

1256. **Hymenocardia grandis**, *Hutchinson* [Euphorbiaceae-Phyllantheae] ; affinis *H. ulmoidi*, Oliv., sed foliis majoribus, stylis intus tomentosis, fructibus duplo majoribus differt.

Arbor magna, 30–50 m. alta ; rami teretes, cortice cinereo obtecti ; ramuli juniores fere glabri, angulares. *Folia* ovata, ovato-elliptica vel ovato-lanceolata, basi rotundata, apice breviter et obtuse acuminata, 6–10 cm. longa, 2–5 cm. lata, integra, membranacea vel tenuiter chartacea, utrinque glabra, nervis lateralibus utrinque 5–8 subtus leviter elevatis ; petioli 8–10 mm. longi, graciles, glabri ; stipulae minutae. *Flores* ♂ et ♀ ignoti. *Fructus* plani, late obovati vel orbiculares, basi brevissime cuneati, apice profunde emarginati, 3–4·5 cm. longi, 2·5–3·5 cm. lati, nucleo obliquo obovato infra medium sito circiter 1·3 cm. longo et 8 mm.

lato, alis membranaceis medio circiter 1·2 mm. latis minute parce puberulis striatis ; styli persistentes, tomentosi, vix 1·3 cm. longi ; pedicelli 8–10 mm. longi, minute parce puberuli ; stipes circiter 5 mm. longus.

Tropical Africa. Togo : Afem, *Kersting*, A. 515 ; Bagu, *Kersting*, 301 ; Njamassilä, *Kersting*, 157. Belgian Congo : Fort Beni, *Mildbraed*, 2421.

A very striking species with a curious distribution, Fort Beni being on the Uganda border of the Congo State, and widely distant from Togoland ; it is the only one besides *H. ulmoides*, Oliv., which has the wings connate around the base of the fruit-body.

1257. **Acalypha eriophylla**, *Hutchinson* [Euphorbiaceae-Crotoneae]; inter species Africanas stipulis magnis trilobatis bractea ♀ fere obtecta valde distincta.

Caules e rhizomate lignoso orti, erecti, simplices, usque ad 20 cm. alti, profunde canaliculati vel sulcati, pilis gracilibus patulis albis villosi. *Folia* caulium apices versus conferta, plus minusve imbricata, subsessilia, ovata vel ovato-elliptica, apice breviter caudato-acuminata, basi rotundata vel (in statu juvenili) paullo cuneata, 1·5–2·5 cm. longa, 0·7–1·4 cm. lata, acute serrata vel subdentata, chartacea, utrinque pilis longis albis dense villosa, nervis lateralibus utrinque prominentibus ; stipulae conspicuae, trilobatae vel tripartitae, 5–8 mm. longae, subcoriaceae, intus glabrae, extus pilosae, segmentis lineari-lanceolatis subacutis vel obtusis. *Flores* monoici, ♀ solitarii, ad basin pedunculi flores ♂ gerentis. *Inflorescentiae* in axillis veteribus ; ♂ pedunculi 2–4 cm. longi, pilosi. *Bracteae* glomerulos ♂ subtendentes, oblongo-lineares, 3 mm. longae, ciliatae. *Gemmae* rubrae, apice parce pubescentes. *Bractea* ♀ stipula fere obtecta, ad medium irregulariter lobata, extus parce pilosa, intus glabra, lobis subulatis pilosis non glandulosis. *Sepala* 3, oblongo-lanceolata, ciliata. *Ovarium* pilis albis dense hirsutum, non glandulosum ; styli graciles, 4 mm. longi, breviter laciniati. *Capsula* et semina non visa.——*A. peduncularis*, var., Pax in Baum Kunene-Samb. Exped. p. 283, non Meisn.

Tropical Africa. Angola : on the Kubango, in the upper part of Massaca, *Baum*, 270.

A very remarkable species associated by Pax with *A. peduncularis*, Meisn. The flowers are monoecious, the stipules large and trilobed, almost hiding the female flower at the base of the male axis, and the styles are free to the base, whilst in *A. peduncularis* the flowers are dioecious, the stipules small and entire, and the styles connate in the lower part for half their length.

1258. **Erythrococca subspicata**, *Prain* [Euphorbiaceae-Crotoneae] ; species racemis femineis spiciformibus folia subaequantibus insignis.

Frutex ramulis glabris, cortice viridescente lenticellato ; gemmae perulatae squamis caducis. *Folia* petiolata, membranacea, ovato-oblonga, acuminata, basi cuneata, margine grosse denticulata, 10–12 cm. longa, 4–4·5 cm. lata, saturate viridia, glabra, nervi laterales utrinsecus circiter 4, subtus paulo elevati ; petiolus glaber, supra canaliculatus, 1–1·5 cm. longus ; stipulae cartilagineae persistentes in aculeos basi latiusculos apice pungentes induratae.

Flores minuti in racemos axillares spiciformes breve pedunculatos dispositi ; pedunculi 5–6 mm. longi, parce pubescentes ; rhachides glabri vel parce pubescentes, ad 10 cm. usque longi ; pedicelli glabri, masculi 2·5 mm. longi, glomerati vel nonnunquam basin racemi versus in spiculas minutas 6–10-floras subremotas aggregati, prope basin articulati ; feminei 2 mm. longi medio articulati ; bracteae minutae, ovato-lanceolatae, pubescentes, masculae pluriflorae, femineae 1-florae. *Calyx maris* viridis, 4-partitus, raro 5-partitus, in alabastro globosus minute apiculatus, extra versus apicem parce hirsutus ; lobi paulo ultra medium partiti ; tubus late campanulatus. *Stamina* 12 ; exteriora 6, cetera centralia ; filamenta loculos antherarum subglobosos excedentia ; glandulae receptaculares oblongae, apice hirsutae, filamentis aequilongae ; exteriores 12 per paria basi connatae sed paribus inter se liberis, ceterae juxtastaminales. *Calyx femineus* minutus ; lobi 3, margine minute ciliati. *Ovarium* glabrum, 3-loculare ; stigmata 3, libera, patula, a basi fimbriato-laciniata. *Discus* hypogynus e squamis 3 cum carpidiis alternantibus ovato-lanceolatis complanatis compositus. *Capsula* 3-cocca, vel 2-cocca didyma, raro monococca ; cocci 6 mm. lati, loculicide dehiscentes. *Semina* arillo rubro fere complete involuta, testa brunneo-nigrescens, minute foveolato-reticulata.—*E. aculeata*, De Wild. & Dur. Ann. Mus. Congo, Bot. sér. 2, i. 50 *et* sér 3, ii. 209 ; Dur. Syll. Fl. Cong. 491 pro parte : nec Benth.

Tropical Africa. Lower Guinea : French Congo ; Oubangi, Krebedji, Fort Sibut, *Chevalier*, 5617. South Central : Congo State ; Equatorial Province, Coquilhatville, *Dewevre*, 692.

Very nearly allied to *Poggeophyton aculeatum*, Pax. (*Engl. Bot. Jahrb.* xix. 89), which is also better referred to *Erythrococca*, but differing in the broader, denticulate, not crenate leaves. The hypogynous disk glands in the two also differ to some extent.

1259. **Erythrococca Laurentii**, *Prain* [Euphorbiaceae-Crotoneae] ; species *E. subspicatae*, Prain, quam maxime affinis sed foliis margine obscure crenulatis petiolisque brevioribus latioribus facile distinguenda.

Frutex ramulis glabris, cortice viridescente lenticellato ; gemmae perulatae squamis persistentibus. *Folia* breve petiolata, membranacea, ovata, acute acuminata, basi cuneata, margine obscure crenulata, 7–8 cm. longa, 3·5–4 cm. lata, saturate viridia, glabra ; nervi laterales utrinsecus 3–4 ; petiolus crassus, glaber, supra late canaliculatus, 0·5 cm. longus ; stipulae cartilagineae persistentes in aculeos basi latiusculos apice pungentes induratae. *Flores* masculi ignoti ; feminei in racemos axillares spiciformes breve pedunculatos dispositi ; pedunculi 0·3–0·4 cm. longi et rhachides ad 8 cm. usque longae parcissime pubescentes ; pedicelli glabri, solitarii, 2 mm. longi, prope basin articulati. *Calyx* femineus minutus ; lobi 3, margine minute ciliati. *Ovarium* glabrum, 3-loculare ; stigmata 3, libera, patula, a basi fimbriato-laciniata. *Discus* hypogynus e squamis 3 cum carpidiis alternantibus ovato-lanceolatis complanatis compositus. *Capsula* ignota.—*E. aculeata*, De Wild. Miss. Laurent 129 ; Dur. Syll. Fl. Cong. 491 pro parte : nec Benth.

Tropical Africa. South Central : Congo State ; Aruwimi Dist., Lie, *Laurent*.

Very closely allied to *E. subspicata*, Prain, with which it agrees as regards its female flowers, but from which it is readily distinguished by its foliage.

1260. **Erythrococca Poggeophyton**, *Prain* [Euphorbiaceae-Crotoneae]; species e grege *E. subspicatum*, Prain, includente sed foliis margine crenatis nec denticulatis et disco hypogyno 2-seriato facillime distinguenda.

Frutex monoicus, ramulis primum pubescentibus demum fere glabris, cortice viridescente lenticellato; gemmae perulatae squamis deciduis. *Folia* breve petiolata, membranacea, oblongo-lanceolata, acuta, basi rotundata, margine crenata, 7·5–10 cm. longa, 2·5 cm. lata, pallide viridia, glabra, nervi laterales utrinsecus 3–4; petiolus pubescens, 0·6–0·8 cm. longus, supra canaliculatus; stipulae cartilagineae persistentes in aculeos basi latiusculos apice pungentes induratae. *Flores* minuti in racemos axillares spiciformes breve pedunculatos dispositi; pedunculi 0·5 cm. longi et rhachides ad 10 cm. usque longae parce pubescentes; pedicelli glabri, 2·5 mm. longi, utriusque sexus solitarii, prope basin articulati; bracteae minutae, ovato-lanceolatae, pubescentes, imae 5–6 flores masculos ceterae femineos subtendentes. *Calyx maris* viridis, in alabastro globosus minute apiculatus, extra versus apicem pubescens, dein paulo ultra medium 4-partitus; lobi membranacei; tubus late campanulatus. *Stamina* 9; exteriora 5, cetera centralia; filamenta loculos antherarum subglobosos excedentia; glandulae receptaculares ovoideo-oblongae, apice hirsutae, filamentis aequilongae; exteriores 10 annulum extrastaminalem efficientes, ceterae juxtastaminales. *Calyx femineus* quam masculus paulo minor; lobi 3, margine minute ciliati. *Ovarium* glabrum, 3-loculare; stigmata 3, libera, patula, a basi fimbriato-laciniata. *Discus* hypogynus 2-seriatus: interior e staminodiis 3 cum carpidiis alternantibus filamentis crassiusculis subcylindrico-clavatis apice antherarum locellos cassos suffulcientibus compositus; exterior e glandulis 5 apice hirsutis glandulis maris receptacularibus consimilibus sed latioribus annulum extrastamodialem efficientibus compositus. *Capsula* 3-cocca, vel 2-cocca didyma, vel casu abortuque monococca; cocci 6 mm. lati, loculicide dehiscentes. *Semina* arillo rubro vix complete involuta, testa brunnea minute foveolato-reticulata.—*Poggeophyton aculeatum*, Pax in Engl. Bot. Jahrb. xix. 89; Dur. & Schinz, Etud. Fl. Cong. 245; Engl. in Sitz. Preuss. Akad. Wiss. xxxviii. 829; Dur. Syll. Fl. Cong. 490, 656.

Tropical Africa. South Central: Congo State; Kasai Dist., on the Lulua, *Pogge*, 1370.

A very interesting species remarkable on account of the double hypogynous disk. The male flowers are borne on the lower part of the female rachises, but are solitary like female ones and not glomerulate as is the rule with the male flowers in this genus. The hypogynous scales, which in most other species of the genus alternate with the carpels and subtend the ovary, are in *E. Poggeophyton* replaced by well developed staminodes; these staminodes are surrounded by an extra-staminodial ring of glands exactly like the extrastaminal ring of receptacular glands met with in the male flowers of a considerable proportion of the species of *Erythrococca*. The fact that the female inflorescence is abnormal

in having a few basal male flowers, suggests that the female flowers may also be abnormal in having staminodes in place of hypogynous scales, and in being provided with an extrastaminodial ring of receptacular glands of the male type. Except that the leaves are crenate in place of denticulate, and that the stamens are 9 instead of 12, *E. Poggeophyton*, apart from its disk characters, differs but slightly from *E. subspicata*.

XX.—DECADES KEWENSES

Plantarum Novarum in Herbario Horti Regii Conservatorum.

DECAS LX.

591. **Polygala aureocauda**, *Dunn* [Polygalaceae]; affinis *P. arillatae*, Ham., sed ab illa ceterisque speciebus gerontogeis habitu arborescente racemisque longis pendulis terminalibus differt.

Arbor parva, ubique floribus exceptis primo puberula, glabrescens. *Folia* alterna, oblonga, acuminata, basi obtusa, 13–15 cm. longa, integra, papyracea, petiolis 5 mm. longis. *Racemi* terminales, fere sessiles, penduli, primo apice caudati, post anthesin ad 30 cm. elongati. *Flores* lutei, singuli, approximati, 1·6 cm. longi, ciliolis exceptis glabri, pedicellis erecto-patentibus 3 mm. longis. *Sepala* 3 exteriora colorata, ciliolata, inaequalia: posticum saccatum, 7 mm. longum; antica plana, minora: 2 interiora obovata, petalis aequilonga. *Petala* postica cum aliis connata, basi in sepali saccam producta. *Carina* apice cristam stipitatam fimbriatam 3 mm. longam gerens. *Capsula* erecta, late obcordata, compressa, 1·2 cm. diametro, concentrice lineata, valvis chartaceis. *Semina* 4 mm. diametro, glabra.

China. Hongkong, *C. Wright*, 22; *Champion*; hill above 300 yds. rifle range, *Urquhart*; ravine on Mount Parker, *Wilford*, 229.

Hemsley referred most of these specimens to *P. arillata* in his Enumeration (Journ. Linn. Soc. xxvi. 59), but noted that they might possibly represent a different species. That this is actually the case I have no doubt after seeing wild trees with their remarkably long drooping terminal racemes.

592. **Coxella**, *Cheesem. et Hemsl.* [Umbelliferae-Seselineae-Angeliceae] nomen genericum novum; planta insignis ab auctoribus ad genera diversa relata, scilicet: *Ligusticum*, *Gingidium*, *Angelicam* et *Aciphyllam*, ab omnibus tamen differt vittarum numero dispositio et magnitudine.

Coxella Dieffenbachii, *Cheesem. et Hemsl.* (species unica). *Herba* glabra, subcarnosa, circiter metralis, inflorescentia radicali dense ramosa. *Folia* omnia radicalia, longe petiolata, flaccida, subternatim 3-pinnata vel 4-pinnata; lamina oblonga vel ovato-oblonga; pinnae primariae 4- vel 5-jugae; segmenta ultima linearia, 4–8 cm. longa, 2–4 mm. lata, mucronata; petiolus quam lamina saepius (an semper?) longior, crassus, vagina apice bidentata, dentibus parvis

obtusis. *Inflorescentiae* amplae axi primaria crassa sulcata, umbellis numerosis compositae; bracteae late vaginatae, lamina pinnatisecta; pedunculi 5–15 cm. longi. *Flores* unisexuales, monoici vel dioici. *Florum masculorum* radii numerosi, graciles, femineorum ad 6. *Involucri bracteae* paucae, lineari-lanceolatae, flores vix excedentes. *Fructus* ad 1·5 cm. longus, 1 cm. latus, calycis dentibus ac stylis minutis; mericarpia saepissime difformia, alterum bialatum, alterum trialatum, alis circiter 5 mm. latis; vittae inconstantes, sed saepius 3 commissurales, 2 vel 3 costales, valleculis bivittatis, costales latissimae, vel interdum deficientes.—*Ligusticum Dieffenbachii*, Hook. f., Handb. Fl. New Zeal. p. 729. *Gingidium Dieffenbachii*, F. Muell., Veg. Chath. Is. p. 17. t. 1. *Aciphylla Dieffenbachii*, Kirk, Student's Fl. New Zeal. p. 211; Cheesm. Man. N.Z. Flora, p. 214. *Anglica Dieffenbachii*, Benth. ex Hook. f., Gen. Plant. vol. i. p. 916; Cheeseman, l. c. 1139.

Chatham Islands. *Travers*, *Cox* and others.

Mr. Cheeseman will describe this plant more fully in another place. For a figure of the habit of the plant and some other particulars see *Kew Bulletin* 1910, p. 124.

593. Ophiorrhiza Lacei, *Craib* [Rubiaceae-Hedyotidae]; species nova *O. Thomsoni*, Hook. f., similis a qua inflorescentia haud glabra facile distinguenda.

Herba 5–11 cm. alta, caule puberulo. *Folia* parum inaequalia, oblongo-elliptica vel ovato-lanceolata, apice acutiuscula, mucronata, rarissime acuminata, basi attenuata, 3·5–10·5 cm. longa, 1·6–4 cm. lata, membranacea, supra parce setulosa vel glabra, subtus ad nervos minute puberula, nervis lateralibus utrinque 10–13 intra marginem arcuatis utrinque conspicuis; petioli 0·5–2·5 cm. longi, minute puberuli; stipulae deciduae. *Cymae* terminales, pedunculo 2–5·5 cm. longo suffultae; bracteae persistentes, lineares vel oblongo-lineares, 0·5–0·8 cm. longae. *Receptaculum* campanulatum, parvum, puberulum. *Calycis* lobi minuti, deltoidei. *Corollae* purpureae tubus circiter 4 mm. longus, superne leviter expansus, extus parce puberulus; lobi 1·5 mm. longi, vix 1 mm. lati. *Capsula* late obcordata, minute puberula.

Indo-China. Upper Burma: Gokteik Gorge, 450 m., *Lace*, 4151.

594. Adenosacme chasalioides, *Craib* [Rubiaceae-Mussaendeae]; ab *A. longifoliae*, Wall., var. *sinensi*, Hemsl., sepalis integris recedit.

Suffrutex floribus exceptis omnino glaber; caules cortice stramineo nitido obtecti. *Folia* lanceolata, apice acuminata, acuta, basi in petiolum 0·5–2 cm. longum attenuata, 6–23 cm. longa, 1·8–5·5 cm. lata, tenuiter chartacea, supra viridia, subtus pallidiora, nervis lateralibus utrinque 10–18 intra marginem arcuatis pagina utraque cum nervis transversis conspicuis; stipulae subpersistentes, foliaceae, 6–7 mm. longae, 4 mm. latae. *Paniculae* terminales; bracteae parvae, deciduae; pedicelli circiter 3 mm. longi. *Receptaculum* glabrum, subhemisphericum; sepala insigniter viridia, lanceolata vel late lanceolata, acuta vel fere acuminata, 3–3·5 mm. longa, 1–1·5 mm. lata, glabra. *Corollae* tubus 1·6 cm. longus, extra glaber, intra parce pilosus, lobi sub anthesi reflexi, late deltoidei, subacuminati, 1·5 mm. longi, 2·5 mm. lati. *Stamina* inclusa, apicem versus

tubi inserta, filamentis brevibus, antheris oblongis 3 mm. longis. *Stylus* 3·5 mm. longus, breviter parce pubescens, ramis duobus 4·5 mm. longis glabris.

Indo-China. Upper Burma: Gokteik Gorge, 450 m., *Lace*, 4860, [Herb. Kew et Herb. Lace].

595. **Saussurea Veitchiana**, *Drummond et Hutchinson* [Compositae-Cynaroideae]; e grege *S. bracteatae*, Decaisne, a *S. obvallata*, Wall., et aliis amplius bracteatis capitulis latius corymbosis demum longe pedunculatis;—a *S. uniflora*, Wall., pappo conspicue biseriato, ab *S. Schultzii*, Hook. fil., folorium margine argute denticulato, nec crasse crenato-serrato, dignoscitur;—a *S. iodostegia*, Hance in Journ. Bot. 1878, p. 109, cujus maxime affinis, propter folia superiora basi dilatata necnon phyllaria acutiora satis distincta.

Herba robusta, circiter 4·5–5 dm. alta, caulibus ad quinque e rhizomate foliis dense coronata, orientibus. *Caules* recti, rigidi, alte et crebre sulcati, superne villis laxis sparse instructi, in 2–10 pedunculos sub capitula incrassatos fistulosos ramificati, inferne demum glabrescentes. *Folia* radicalia anguste oblongo-lanceolata, sub anthesi persistentia, petiolis vix 4 cm. longis suffulta, caulina suberecta, omnino sessilia, infima longe vaginata, anguste oblongo-lanceolata, longitudine 20 cm., latitudine paullo infra medium fere 4 cm. attingentia, superiora ovato-lanceolata, obtuse auriculata, omnia semiamplexicaulia, nitide virescentia, costa pallidiore robustissima basin versus expansa, nervis secundariis abruptius ascendentibus in pagina superiore leviter immersis, inferiore elevatis eleganter anastomosantibus, supra fere glabrata, subtus laxe pilosa, marginibus plus minusve undulatis remote et argute denticulatis, apice acuta, versus summum caulem sensim diminuentia, denique in bracteas membranaceas maximas circiter 4–6 cm. longas 2–3 cm. latas plus minusve cymbiformes obscure carinatas apice angustissime acuminatas pulchre purpurascentes capitula juniora quasi involucrantes transformata. *Capitula* plus minusve araneosa, aestivationis tempore fere ovoidea, superne nonnihil constricta, circiter 2·5 cm. longa, parte ventricosa circiter 1·2 cm. lata, per summos flosculos diametro vix 2·5 cm. attingentia, flosculos 20–30 laxe divergentes atro-purpureos includentia. *Receptaculum* (in capitulis junioribus) circiter 5 mm. latum, fimbrillis capillaribus subpellucidis ornatum. *Phyllaria* appresse imbricata, fere uniformia, exteriora ovato-lanceolata, circiter 1 cm. longa, 4 mm. lata, laxe pilosa, acuta, nigrescentia, intus pallide virescentia, nitida, glabrata, interiora magis acuminata, longiora. *Flosculorum* tubus in parte inferiore multo longiore tenuissimus, plus minusve angulatus, glaber, subito late campanulatus, 8 mm. longus: limbus in quinque segmenta linearia basi obscure saccata divisus. *Antherae* basi caudato-lanatae, demum atratae. *Stylus* sub stigmata minute pubescens. *Achaenia* obtuse quadrangula, subglabra, pappo biseriato exteriore e setis scabrioribus paucis purpurascentibus deciduis interiore satis copiosis duplo longioribus plumosis demum fuscescentibus consistente munita.

Central China. Fang, *E. H. Wilson*, 2407.

The species has been described from living material and a habit-photograph communicated from Glasnevin, also from specimens received from Messrs. J. Veitch and Sons.

This is a remarkable species belonging to the "bracteate" group, most nearly allied to *S. iodostegia*, Hance in Journ. Bot. 1878, p. 109, discovered by Hancock in 1876, but readily distinguished by the much broader rounded bases of the stem leaves and the acute tips of the phyllaries which in *S. iodostegia* are obtuse and almost strap-shaped upwards; the solitary type of Hance's plant is very imperfect, but Mr. Spencer Moore has kindly referred us to a better specimen collected recently by Father Hughes in the same region.

596. **Gymnema Lacei**, *Craib* [Asclepiadaceae-Marsdenieae]; a *G. tingente*, Wight et Arn., foliis oblongo-lanceolatis facile distinguendum.

Caules graciles, teretes, praeter nodos parcissime puberulos bifacialiter puberuli. *Folia* oblongo-lanceolata, apice plus minusve distincte acuminata, basi rotundata, nisi juniora obtusa, 5–7·3 cm. longa, 1·3–2·3 cm. lata, membranacea vel rigide membranacea, margine integro recurvo, pagina superiore costa nervisque puberulis exceptis glabra, inferiore indumento ut in superiore sed paulo densiore, nervis lateralibus utrinque circiter 4 obliquis intra marginem arcuatis pagina utraque sicco subprominulis; petioli circiter 4 mm. longi, supra canaliculati, puberuli. *Pedicelli* 0·5 cm. longi, puberuli. *Sepala* late lanceolata, acuta, 3 mm. longa, 1·5 mm. lata, ciliolata. *Corallae* tubus sepala vix aequans; lobi oblongi, obtusi, 4 mm. longi, 2 mm. lati. *Corona* e lineis duabus carnosis pubescentibus corollae lobis alternantibus et fere ad corollae tubi basem continuatis constituta. *Antherae* in appendicem membranaceam productae; pollinia oblonga, erecta.

Indo-China. Upper Burma: Katha; Kadu, *Lace*, 4297.

forma **minor**, *Craib*, a typo partibus omnibus minoribus differt.

Indo-China. Upper Burma: Kyaukse Hill, *Lace*, 4871.

Lace, 4871 is apparently only a starved form of No. 4297—there appears to be no difference except in the size of the various parts and a very slight difference in the shape of the anther appendage.

597. **Swertia Lacei**, *Craib* [Gentianaceae-Swertieae]; a *S. striata*, Coll. et Hemsl., foliis angustioribus, corollae nervis subobscuris, nectariis multo minoribus distincta.

Herba erecta, parce ramosa, circiter 4 dm. alta, glabra. *Folia* sessilia, linearia, apice mucronulata, 1–3·8 cm. longa, rigidiuscula, margine recurvo, nervis lateralibus omnino obscuris. *Cymae* pluriflorae, ramulis axillaribus plerumque arcuatis ad 3 cm. longis gestae; pedicelli ad 8 mm. longi. *Sepala* 4, lineari-lanceolata, acuta, 4–5·5 mm. longa, 1–1·5 mm. lata. *Corollae* tubus brevis; lobi elliptici vel obovata-elliptici, obtusi, 7 mm. longi, 5 mm. lati, intus nectaris semiorbiculari breviter fimbriato ornati, nervis subobscuris. *Filamenta* 3 mm. longa, inferne gradatim dilatata; antherae 1 mm. longae. *Pistillum* 4 mm. altum, superne in stylum brevem attenuatum, glabrum.

Indo-China. Upper Burma: Maymyo Plateau, 1050 m., *Lace*, 4373.

598. **Fimbristylis (Abilgaardia, *Vahl.*) straminea,** *Turrill* [Cyperaceae-Scirpeae]; species *F. fuscae*, Benth., affinis, statura minore, spiculis paucioribus, glumis stramineis glabris angustioribus numerosioribus, stylo breviore et nuce minore differt.

Planta perennis, erecta. *Culmi* 6–12 cm. alti, 3–5-spiculigeri. *Folia* brevia, recurvata, 1 mm. lata, quartam partem culmi aequantia, subacuta, serrata. *Umbella* saepissime simplex; radii usque ad 2 cm. longi. *Bracteae* 3, longissima 7–8 mm. longa, brevissima 4 mm. longa, 0·4 mm. latae. *Spiculae* lineari-lanceolatae, 7 mm. longae, 1·5 mm. latae, glumis nucigeris 10. *Glumae* acuminatae, glabrae carina ciliata excepta, straminaeae, 3 mm. longae, 0·5 mm. latae, inferiores subdistichae, 3 imae vacuae. *Stamina* 2. *Stylus* 2 mm. longus, glaber, 3-fidus cum basi dilatata deciduus. *Nux* obovoidea, trigona, 0·75 mm. longa, verrucosa, alba.

Siam. Chiengmai; Doi Sootep, 550–600 m., *Kerr*, 832.

599. **Oxytenanthera Lacei,** *Gamble* [Gramineae-Bambuseae]; affinis *O. Thwaitesii*, Munro, sed vix scandens, spiculis 2-floris, cataphyllis brevioribus haud aeque conspicue auriculatis et foliis tenuioribus differt.

Frutex erectus. *Culmi* virides vel viridi-glaucescentes, fistulosi, laxe ad basin fasciculati, ramis foliiferis duris ultimis non fistulosis, ramis floriferis fistulosis vel solidis teretibus. *Cataphylla* culmorum 20–30 cm. longa, ad basin 15–20 cm. lata, ad apicem 4–6 cm. lata, straminea, conspicue striata, dorso in parte superiore dense spinulis nigrescentibus tecta; lamina subulato-lanceolata, reflexa, 10–30 cm. longa, basi paullo contracta et utrinque auriculis brevibus plicatis fimbriatis instructa; ligula circa 5 mm. longa, ore longe fimbriata. *Folia* tenuia, pallida, in ramis gracilibus geniculatis fasciculatis; vaginae stramineae, striatae, dorso spiculis albis munitae, ore auriculis longis sparse sed longe fimbriatis cito deciduis instructae; laminae 10–20 cm. longae, 1–2 cm. latae, supra scaberrimae, infra pubescentes, marginibus etiam scabrae, apice acuminatissimae, basi subcordatae, nervis utrinque 5 infra conspicuis; ligulae breves, membranaceae, dentatae. *Flores* in glomerulis ad nodos ramorum 20–40 cm. longorum fasciculatorum; glomeruli circa 2 cm. diametro, ad 10–12 spiculas fertiles cum multis infertilibus minoribus et bracteis paleaceis mixtas ferentes; spiculae 5–7 mm. longae, glaberrimae, basi bracteis 1–3 parvis suffultae; glumae vacuae 2–3, ovatae, mucronatae, inferior 3 mm., superior 4–5 mm. longa; flores fertiles 2; glumae florentes (valvae) ovatae, longe mucronatae, floris inferioris 6 mm. longae, superioris 8 mm. longae; palea floris inferioris bicarinata, carinis ciliata, apice emarginata, 5-nervis, floris superioris convoluta, glabra, apiculata. *Stamina* 6, purpurea; juniora subsessilia, libera, vetustiora filamentis in tubum longissimum exsertum coalita, tandem soluta; antherae lineares, apice mucronatae. *Ovarium* ovato-lanceolatum, in stylum gracilem pubescentem alternatum. *Caryopsis* ignota.

Burma. Thaton District: E. of Salween river, Hlaingbwe Forest Reserve and Melaung, *Lace*, 4578, 4584. (Feb. 1909).

600. **Selaginella strigosa,** *Beddome* [Selaginellaceae]; ex affinitate *S. plumosae*, Baker, a qua foliis strigosis differt.

Caulis prostratus, 15–20 cm. longus, angularis, pinnatim ramosus ; rami ad 1 cm. longi. *Folia* lateralia caulina inter se 0·5 mm. distantia, ramealia approximata, oblique ovata, cuspidata, 2 mm. longa, 0·75 mm. lata, basi latere superiore cordata imbricataque, ciliata, utrinque plus minusve strigosa ; folia intermedia 1·5 mm. longa, late ovata, longe cuspidata, dense ciliata. *Spicae* 8 mm. longae, tetragonae ; bracteae e basi ovata cuspidato-acuminatae, fortiter carinatae, ciliatae.

Malay Peninsula. Selangor : Klang Gates, *Ridley*, 13,442 and 13,446 ; Ginting Bida, *Ridley*, 7815 and 7825.

XXI.—ADINOBOTRYS AND PADBRUGGEA.

S. T. Dunn.

A large proportion of the dense tropical forest which clothes the sea shores of Martaban and Tennasserim consists, according to Wallich (Pl. As. Rar. i. (1830), 70 t. 78), of the fine leguminous tree which the Burmese call *Chukkha*. When in flower the crown is covered with dense panicles of dark purple flowers, and Wallich, who considered it a relation of *Pongamia glabra*, therefore named it *Pongamia atropurpurea*. While it can hardly be associated with *Pongamia*, which is characterised by axillary racemes, it is not clear upon what grounds Bentham in his notes upon *Millettia* in *Plantae Junghunianae* (1851–5), 249, transferred it to that genus, for its oval, one-seeded, indehiscent fruit and the few-ovuled, stipitate ovary, well shown in the figure above cited, indicate widely different characters from all the other Millettias then known.

Closely allied to this tree in floral structure and in fruiting characters, though quite different in habit, are four woody lianes from the same part of the world, viz., the slender woody climber described by Bentham as *Millettia eriantha*, the Bornean species *M. Nieuwenhuisii* and two others described for the first time in this paper. These share the following combination of characters which distinguish them from all true Millettias : inflorescence densely crowded, wings and keel semi-sagittate, ovary stipitate, ovules 2 (or 3), pod one-seeded, indehiscent, and it is therefore proposed to make the five species the types of a new genus under the name of *Adinobotrys* (ἀδινος crowded, βοτρυς bunch).

Equally distinct from *Millettia*, though referred to it in all recent floras, are two more lianes which inhabit the dense jungles of Selangor and Perak, and possess, like *Adinobotrys*, stipitate few-ovuled ovaries and one-seeded pods. They differ however from the latter genus in their loose inflorescences, wings and keel cuneate or rounded below and in their pods which sometimes open naturally at maturity. These are *M. Maingayi*, Baker, and *M. oocarpa*, Prain.

When Baker ascribed the above species to *Millettia* he was following the precedent set by Bentham of including plants with stalked ovaries and one-seeded indehiscent pods—the pods of his species are not known to dehisce—in that genus. He was doubtless unaware that, many years previously, Miquel (Fl. Ned. Ind. i. (1855), 150), had described a very similar plant from the forests of Java. Even without fruit Miquel detected the distinction of this

liane from *Millettia* and made it the type of a new genus which he called *Padbruggea* after Robert Padbrugge, patron of Rumphius and Governor of the island of Amboina. A few years later the discovery of the fruit of *P. dasyphylla*, as he called his species, by Teysmann in Sumatra gave further support to his decision. *Padbruggea dasyphylla* is actually the same as *Millettia oocarpa*, and with *M. Maingayi* may conveniently be restored to its generic status under Miquel's designation and be placed beside *Adinobotrys*.

By the definition of *Adinobotrys* and the revival of *Padbruggea* the heterogeneous collection of groups which has gradually accumulated around Wight and Arnott's genus *Millettia* will lose some of its most aberrant members. These two genera, in spite of the above-mentioned characters which distinguish them from *Millettia*, are nevertheless more nearly related to that genus than to *Pterocarpus*, *Derris*, *Pongamia* and the other genera with indehiscent pods which Bentham placed together in the tribe *Dalbergieae*. Thus *Adinobotrys erianthus* (*Millettia eriantha*), agrees in its petal and disc characters with *M. cinerea*, which is otherwise a true *Millettia*, while it approaches *Wistaria*, an unquestionably galegioid genus in all its floral characters excepting that its ovules are few.

Thanks to the courtesy of the Director of the Royal Botanic Gardens, Kew, the writer has been able to carry out the whole of the work entailed in this paper in the Herbarium of that establishment, and all the specimens referred to will be found there.

Adinobotrys.

Adinobotrys, *Dunn*, gen. nov. [Leguminosae-Galegeae]; affinis *Millettiae*, Wight et Arn., sed ovario stipitato, legumine monospermo indehiscente differt.

Calyx breviter 5-dentatus, dentibus duobus anticis partim connatis. *Vexilli* lamina rotundata, ungue brevi. *Alae* oblongae, semisagittatae. *Carina* alis similis. *Stamina* vexillari soluto diadelphia. *Ovarium* stipitatum, 2- (1- vel 3-) ovulatum. *Stylus* incurvus, stigmate parvo terminali. *Legumen* oviforme, paullo compressum, indehiscens. *Semen* unicum, magnum.

Frutices scandentes vel raro arbores. *Folia* alterna, imparipinnata, foliolis oppositis. *Flores* in paniculis racemisve saepius lateralibus dense conferti. *Bracteae* saepe conspicuae, ad anthesin persistentes; bracteolae latae.

Species 4 Indo-malayanae et 1 Chinensis.

Clavis specierum.

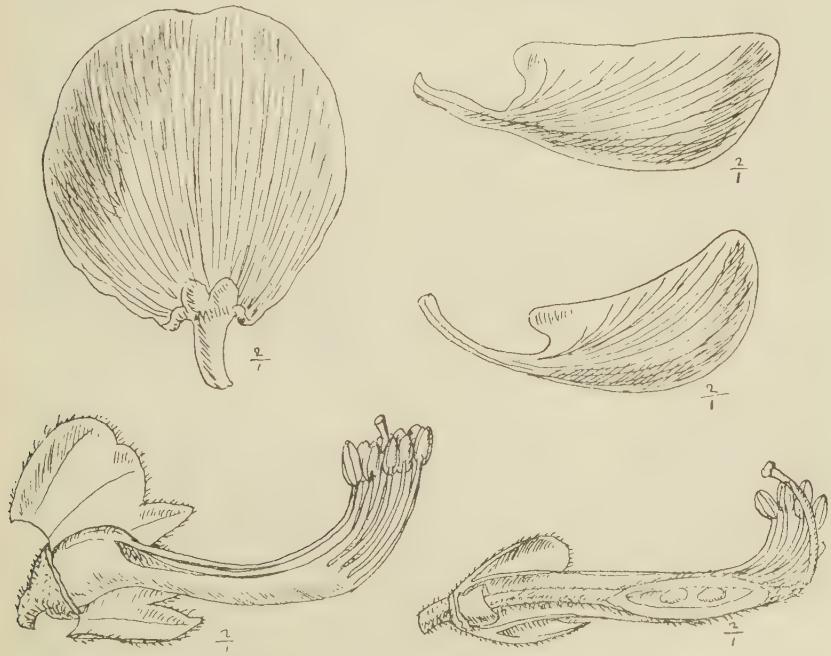
Inflorescentiae laterales—
  Racemi breves—
    Racemi floresque sessiles ... ... 1. *A. erianthus.*
    Flores longe pedicellati ... ... 2. *A. filipes.*
  Paniculae magnae—
    Vexillum cordatum ... ... 3. *A. Nieuwenhuisii.*
    Vexillum basi acuminatum ... ... 4. *A. myrianthus.*
Inflorescentiae terminales ... ... 5. *A. atropurpureus.*

1. A. erianthus, *Dunn*, nom. nov. *Millettia eriantha*, Benth. in Plant. Jungh. (1851–55), 250; Miq. Fl. Ned. Ind. i. (1855), 155; Baker in Hook. f. Fl. Brit. Ind. ii. (1876), 108; Prain in King in Journ. As. Soc. Beng. lxvi. 2 (1897), 89.

Malay Peninsula. *Griffith*, 1761, 1836; Malacca, *Griffith*, 1845, *Maingay*, 519; Perak, fide *Prain* (l.c.); Pahang, *Ridley*, 2644.

2. **A. filipes**, *Dunn*, sp. n.; affinis *A. eriantho*, Dunn, sed floribus graciliter pedicellatis differt.

Frutex parte juveni dense rufo-hirsuta, alte scandens. *Folia* pinnata, matura non visa; foliola vix adulta oblonga, obtuse



acuminata, basi rotundata, 5 cm. longa, membranacea, glabrescentia, 6–7-paribus, petiolulis 3 mm. longis, stipellis nullis. *Racemi* laterales, praecoces, tandem 12 cm. longi, rachide ut pedicellis calycibusque breviter velutina. *Flores* singuli, approximati, 2·4–2·6 cm. longi; bracteae ante anthesin flores omnino obtegentes, ovatae, acuminatae, ad 2 cm. longae, membranaceae, tenuiter sericeae; pedicelli 2 cm. longi. *Calyx* 6 mm. longus, 5 mm. latus, dentibus 3 posterioribus tubo aequilongis, vexillari breviore bidentato. *Petala* violacea vel rosea. *Vexillum* orbiculatum, breviter unguiculatum, basi laminae biappendiculatum. *Alae* et *carina* antice paullo falcatae. *Stamen* vexillari solutum. *Discus* brevis, cylindricus, basem ovarii cingens. *Ovarium* longe stipitatum, biovulatum, sericeum.

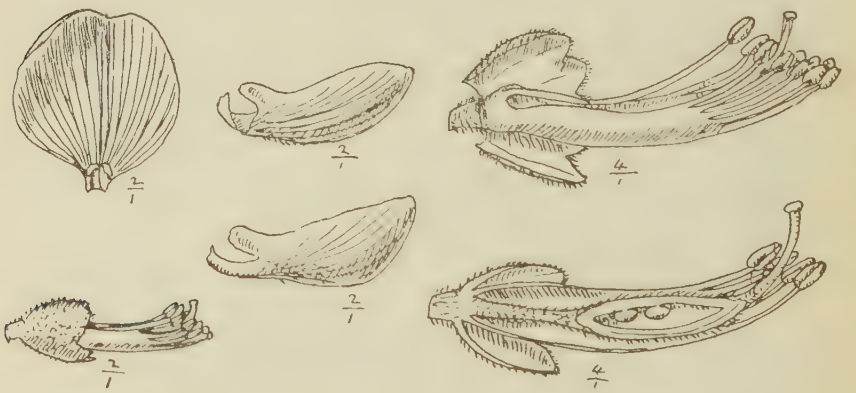
China. Yunnan: Szemao, East Mountains, forests 1520 m., *Henry* 11,610. Kwangsi: Lungchow, *Morse*, 642.

In the markedly perigynous insertion of the corolla and stamens and the persistence of the large bracts up to the time of flowering, this species approaches *A. crianthus* more nearly than any other member of the genus. It differs from all and approaches *Padbruggea* in its auriculate standard.

3. **A. Nieuwenhuisii**, *Dunn*, nom. nov.; *Millettia Nieuwenhuisii*, J. J. Smith in Bull. Dép. Agric. Ind. Néerl. iii. (1906), 17; Ic. Bogor. t. 230–1 (1907).

Borneo (fide *J. J. Smith*). Cult. in Hort. Bogor., 86.

4. **A. myrianthus**, *Dunn*, sp. nov.; affinis *A. Nieuwenhuisii*, Dunn, sed bracteis bracteolisque minoribus vexillo non cordato, foliolis paucioribus differt.



Frutex scandens. *Folia* 1–2-juga, 30–40 cm. longa; foliola ovato-oblonga, acuminata, caudata, basi rotundata vel subcordata, 10–20 cm. longa, chartacea, glabra, utrinque reticulata, venis 5–6-paribus, petiolulis 8 mm. longis, stipellis nullis. *Panicula* lateralis, 20–30 cm. longa, ramis numerosis, longis, flagelliformibus,

Flores secus ramos dense subspicati, bracteis caducis. *Calyx* campanulatus, 2–3 mm. longus, lobis 4, parvis, vexillari bidentato, sicut rachis, vexillum et carina breviter sericeo-tomentosus, bracteolis supra basin tubi affixis, sed ejus apicem non attingentibus. *Vexillum* basi rotundatum vel acuminatum, exauriculatum, 8–9 mm. longum. *Alae* oblongae, basi antice semi-sagittae. *Carina* similis. *Stamen* vexillare ab aliis liberum saepe vexilli ungui plicata amplexum. *Ovarium* utrinque angustatum, medio biovulatum, sericeum. *Legumen* ignotum.

Borneo. Sarawak, *Beccari*, 656, 887, 875: *Hose*, 248 (Marudi), 436 (Entovut River): *Haviland* and *Hose*, 3376 (Kuching); Niah, *Haviland* and *Hose*, 3279.

Besides the differential characters mentioned above, this species may be distinguished from *A. Nieuwenhuisii* by the position of the curious bracteoles, which are attached below the middle of the calyx and thus do not reach the sinuses of the lateral teeth, instead of surpassing them as in that species.

5. **A. atropurpureus**, Dunn, nom. nov. *Pongamia atropurpurea*, Wall., Cat. n. 5910, Pl. As. Rar. i. (1830), 70, t. 78. *Millettia atropurpurea*, Benth. in Pl. Jungh. (1851–5), 249; Miq. Fl. Ind. Bot. i. (1855), 157; Baker in Hook. f. Fl. Brit. Ind. ii. (1876), 108; Prain in Journ. As. Soc. Beng. lxvi. 2 (1897), 89.

Indo-Malaya. Tenasserim to Sumatra.

Burmah. Tenasserim, Wallich 5910, *Falconer*, 551, *Griffith*, 1763 (Moulmein) and Merqui, *Beddome*, 25.

Malay Peninsula. Penang Hill, *McNair*; Malacca, *Griffith*, *Maingay*, 517; Jalor, *Gwynne-Vaughan*, 512; Perak, *Wray*, 2526, *King's Collector*, 8012; Pahang, *Ridley*, 2610. Sumatra. *Teysmann*. Borneo. *Haviland*, 1776.

Padbruggea.

Padbruggea, Miq. Fl. Ind. Bot. i. (1855), 150; Suppl. (1860), 298.

The genus, which has been generally overlooked, is distinguished from *Millettia* by its stipitate, 2-ovuled ovaries, from *Wistaria* by the small number of ovules in the ovary and by its one-seeded subindehiscent fruit, and from *Adinobotrys* by its lax inflorescence and by the unappendaged wings and keel of its flowers.

Clavis specierum.

Leaflets revolute, densely tomentose below	... *P. dasyphylla.*
Leaflets flat, nearly glabrous when mature	... *P. Maingayi.*

P. dasyphylla, Miq. l. c. *Millettia oocarpa*, Prain in Journ. As. Soc. Beng. lxvi. 2 (1897), 365; Perak, *Scortechini*, 429; *Wray*, 2141.

Malay Peninsula.
Java. *Horsfield*, 19.

P. Maingayi, *Dunn*, nom. nov. ; *Millettia Maingayi*, Baker, in Hook. f. Fl. Brit. Ind. ii. (1876), 110 ; Prain l. c. 364.

Malay Peninsula. Perak, *King's Collector*, 8759 ; Selangor (fide *Prain*) ; Singapore, *Maingay*, 605 ; *Hallett*, 145 ; *Ridley*.

XXII.—BALATA.

Mimusops bidentata, DC.

(*M. Balata*, var. *Schomburgkii*, Pierre : *Sapota Mulleri*, Bl.)

J. M. Hillier.

This is one of the more important products of the natural order *Sapotaceae*, which includes the Gutta trees of Malaya and also many oil-bearing seeds of considerable economic value. On the authority of Dr. J. Huber,* the above is the only species definitely known to afford the Balata of commerce, though it is possible and indeed probable that other nearly allied species, natives of Dutch Guiana and the Lower Orinoco may also yield this product.

Balata is the inspissated juice of the Bullet or Bully tree, a large forest tree of Tropical America growing to a height of one hundred and twenty feet with, usually, a large spreading head, and a trunk

* Arvores de borracha e de Balata da regiao amazonica, pelo Dr. J. Huber, Boletim du Museu Goeldi, Dec. 1904, vol. iv., p. 415.

sixty to seventy feet long and four to five feet in diameter. The trunk is nearly cylindric, and as it does not buttress much at the base, is of almost uniform size from a few feet above the ground up to the first branches. The leaves are clustered towards the ends of the branchlets. They are four to eight inches long, by two to three inches wide, ovate-oblong in shape, and rounded or apiculate at the end, very leathery in texture, dark green above, but from the presence of a very fine lepidote coating are of a bright rusty tint beneath while young. The flowers spring from among the leaves and are very small but profusely produced. The fruit is about the size of a marble, resembling in taste and character the fruit of the allied Sapodilla or Naseberry tree (*Achras Sapota*), a much esteemed fruit of Tropical America and of the West Indies. This latter species is also the source of Gum Chicle largely used in the United States of America as a masticatory.

Balata is collected for commercial purposes in the Guianas and Venezuela, from whence it is exported to the United States of America and to Europe. There is little doubt that the possibility of converting the milky juice of this tree to industrial purposes was first discovered by the Dutch in the Colony of Surinam. In the Journal of the Society of Arts, October 9th, 1857, p. 625, Professor S. Bleekrode, after reviewing the state of the gutta percha market in Amsterdam, gives a full and interesting account of the Balata tree and also the results of chemical investigations made by him on samples of the latex. From this paper it appears that the tree is commonly called Bolletrie (paardenvleesch, Dutch) but this popular name gives no information as to its true origin, for it is given to various plants of different botanical affinity. In the description of Guiana, published in 1770, by the Dutch Governor, T. T. Hartsinck, no mention is made of the milky juice of the Bolletrie (Boerewy, Dutch), called Boerowé by the Arawack Indians. Mr. Hartsinck, however, gives a full description of the tree, which has been confirmed by recent travellers ; he describes it as having a thick rough bark, containing a gum-like juice, or a bitter oil ; the fruit resembles the plum, and is sweet, with a white, hard kernel ; the leaves are like those of the laurel, glossy, oval and acuminated.

In continuation, Professor Bleekrode refers to a letter written to him by Mr. J. A. Muller from Paramaribo respecting the latex forwarded for examination and described by the writer as having been obtained from the Bullet tree, and also quotes from the *Revue Coloniale* (de Juillet Août, 1855), where it is stated, that in French Guiana will be found a tree (of the genus *Ficus*) containing a substance intermediate between caoutchouc and gutta percha. " Hence it was of the highest interest to decide upon the botanical species of this plant, which gives the milky juice of gutta percha. . . . .

" As an accurate description of a plant requires the examination of the flowers, foliage, and fruit, I took care to have specimens sent to me at the first opportunity. I received, in April last, the leaves and fruit ; the flowers I am still expecting. I had thus sufficient means to determine the species of the Bullet tree, besides having the assistance of my friend and colleague, the well known botanical Professor, Dr. Blume. It was decided to be a new species

of *Sapota*, which has received, in honour of the first observer, Mr. Muller, at Paramaribo, the name *Sapota Mulleri*, Bl. A full description, with a drawing of the new plant, is given in the Dutch Journel De Volksvlijt, uitgegeven door de vereeniging boor Volksvlijt, te Amsterdam, 1857, Nos. 6 and 7, p. 279.

"An illustration is given of the fruit of the *Lucuma mammosa* [to which also the name Bolletrie is applied] to show the difference between the fruit of our gutta percha Bullet tree and that of the Lucuma. Several other botanical characters have led to the conclusion that our Bullet tree is not a species of Mimusops, this genus being indigenous to tropical Asia, as the Sapota is to the New World. The Bullet tree, or gutta percha Sapota, is very common in groups on the hilly country in Surinam, above the alluvial plains. To collect the milky juice an incision is made in the trunk, seven feet above the ground, and this is enclosed by a ring of clay, which serves at the same time as a reservoir. The juice flows out of the stratum between the liber and the alburnum in profusion ; there is no necessity to cut the tree down, as was universally done at the commencement of the collection of gutta percha in the Indian Archipelago. . . . . .

A specimen of the gutta percha of Surinam, shown at the exchange at Amsterdam, was declared to be of first-rate quality.

Another specimen was tried in the gutta percha manufactory at Amsterdam. The result was, that it was declared to be of first-rate quality and that its strength was proved. It appears, however, that the gutta percha requires some time before it is thoroughly solid and hardened."

In the description of a specimen of the wood of the Buruch, Bully, or Bullet tree forwarded with other products from British Guiana to the Paris Universal Exhibition in 1855, it is stated in the catalogue that the leaves, branches, and trunk produce a whitish milk. Samples both of the milk and inspissated juice were sent from British Guiana to the London International Exhibition of 1862, also to the Paris Universal Exhibition of 1867. In the preface to the catalogue of the latter contribution from British Guiana, p. lxvii., Mr. D. Melville, of Berbice, makes the following remarks on the subject :—"The first attempt to introduce this material to the notice of British capitalists as an article possessing some probable commercial value was made by the writer early in the year 1860, when a small quantity of the gum sufficient for experimental purposes was sent to the house of Messrs. Silver & Co., of London. This was sent in consequence of a promise made to Mr. Silver in 1859, when visiting their factory at Silvertown, to search the forests of Guiana on my return for a substitute for india-rubber, Mr. S. having expressed his apprehensions of the supply of that material failing them. The report on the article was then hardly satisfactory ; but at the Exhibition of 1862, Sir William Holmes actively interested himself in bringing the specimens with which he was provided into further and more prominent notice. Towards the end of that year an application was made by the Messrs. Silver urging that a few pounds of the dried material should be forwarded by return mail, if possible, to

enable them to make certain experiments that might lead to satisfactory results. It so happened, that this communication was received just a day or two previous to the dispatching of a boat and crew which had been prepared for the Canje Creek for the purpose of collecting a quantity of the gum meant to be submitted to the Gutta Percha Company of London. No delay was therefore experienced in the matter. The quantity of balata asked for by the Messrs. Silver was promptly forwarded, and this, followed by larger shipments, formed the initiatory of a new trade in the Canje Creek."

In many of its properties balata is stated to occupy an intermediate position between india-rubber and gutta percha, possessing the elasticity of the one and ductility of the other, without the intractability of the former or the brittleness of the latter, thus becoming under certain circumstances more valuable than either for industrial purposes. It is found in commerce both in block form and in sheets and is chiefly used as a substitute for gutta percha, and amongst other applications is employed in the manufacture of belting for machinery, hose, solid tyres, moulded goods, tubing, fruit jar rings, boot soles, &c.

In Colonial Report No. 671, British Guiana, for 1909–1910, it is stated that the output of balata for the year was 1,048,266 lbs., which shows a decrease of some 50,000 lbs. on that of the previous year, but this is accounted for by the fact that negotiations were proceeding between an English Company, "The Consolidated Rubber and Balata Estates Limited," and some of the larger balata licencees in the Colony for the transfers of their holdings. These negotiations were not brought to a close until the end of the year, and little work was done on the tracts meanwhile.

In Diplomatic and Consular Report No. 4580, Annual Series, on the trade, commerce and agriculture of Surinam for the year 1909, we find that the export of balata for the period was 628 tons of the value of £117,834, against 454 tons of the value of £83,269 shipped during 1908. The industry in this country shows a considerable improvement but there is, however, a great danger of its being ruined, owing to the want of supervision in the forests. The bleeders are paid according to the weight of the dried balata obtained, and it is stated that instead of bleeding the tree in the manner laid down by the Government, they extract as much as possible from each tree ; this practice, if allowed to continue, must eventually bring the industry to an end. It is desirable that a sufficient number of trustworthy inspectors or wardens should be appointed to protect the trees by seeing that the existing laws are observed, and so to preserve one of the most valuable assets of the Colony. With regard to labour it appears that many more men are being employed this year ; recently 100 men were imported from St. Lucia for the work ; these had, of course, no previous experience.

Quoting from Diplomatic and Consular Report No. 4411, Annual Series, on the trade and commerce of Ciudad Bolivar, Venezuela, for the year 1909 it appears that balata (block) was exported to the extent of 1624 metric tons. The high price prevailing for this article has stimulated its production. The system of felling the

trees to collect the gum still continues, and the productive forests are becoming more and more distant from the base of operations. The extent of country bearing the balata trees appears, however, to be so great that as soon as one district is exhausted another is discovered. Considering the total absence of modern transport facilities and that the product has to be carried from the forests over bad roads and tracks on donkey back or in ox wagons for distances exceeding 200 and 300 miles, it is surprising that the production should be so well maintained.

The Board of Trade Journal, April 27th, 1911, states, upon the authority of H.M. Consul at Ciudad Bolivar, that block balata was shipped in 1910 to the extent of 1880 metric tons, of the declared value of £451,275. This is the largest quantity and the highest value reached in any one year up to the present. The production in 1909, itself a record one, was 1624 tons. The principal supply now comes from very distant parts beyond the Caroni and Paragua rivers, and from both sides of the Cuyuni, near the frontier of British Guiana. It is estimated that these forests contain a further four years' supply. After that period it is difficult at present to see where any considerable quantity can come from, and even now these distant parts can only be worked while prices of balata gum remain high. Should they at any time fall below 1*s.* 9*d.* to 2*s.* per lb. it appears that it would be impossible to continue the working at a profit. It is said that even now a large proportion of the block balata shipped from Ciudad Bolivar is not the pure article, but is mixed with gums from other trees like the Pendare, Purguillo. Mata Palo, &c. It appears that these latter gums alone would scarcely find a good market, and they are therefore in many cases worked in with balata, in the proportion of one in three.

Those who are interested, commercially or otherwise, in this subject will find in "Rubber and Balata in British Guiana," by J. B. Harrison and F. A. Stockdale, full and trustworthy information on the present condition of the industry in that Colony.

This work has recently been issued by the Department of Science and Agriculture of British Guiana, and contains two maps and twenty-four illustrations. Price sixpence.

At present the market for this product is firm with a limited supply, the "block" form realizing 3*s.* and the "sheet" 3*s.* 11*d.* per lb.

Previous notes on this subject have appeared in the Annual Reports of the Royal Botanic Gardens, 1873, p. 6, 1877, p. 31, 1878, p. 39, 1881, p. 46.

XXIII.—MISCELLANEOUS NOTES.

W. E. Gumbleton.—The death of this gentleman, which occurred on April 4 at his residence at Belgrove, Queenstown, Co. Cork, has removed one who took a keen interest in Kew, and more particularly in that channel in which the energies of the establishment flow which is represented by the preparation of the Botanical Magazine. This interest he showed equally in a readiness to offer criticism and, what was of more consequence, in a constant desire

to assist. Gifted with an artistic temperament and at the same time possessed of a wide knowledge and endowed with a strong character, his personality was an extremely interesting one. A constitutional readiness to cavil at the opinions expressed by others and a peculiar sensitiveness to contradiction so far as his own views were concerned, prevented his being universally popular. But by those who could realise and appreciate his enthusiasm, who could find their way to the kernel within the husk—and the number of these was by no means limited—the death of Mr. Gumbleton will be felt as having created one of those blanks which cannot readily be filled. A man of means, leisure and taste, Mr. Gumbleton devoted himself to gardening and accumulated at Belgrove one of the richest libraries of works bearing on this subject in Ireland, and brought together there an extremely interesting collection of plants. These he dealt with in a characteristic and methodical fashion, concentrating his interest for the time being on some special genus or group of genera, acquiring as many forms as possible of the genus or group on which his attention was focussed and studying them thoroughly from the horticultural standpoint. He could not, however, be induced to supplement the notes which he made and often published, by the preservation of authentic specimens; as a consequence much of the varied and valuable information so carefully acquired disappears with his decease; a circumstance which intensifies the regret which his death causes, not only to those who fully understood him and appreciated his many high qualities, but to those who only knew him as a keen and competent student of garden plants.

Seeds of Chinese Trees and Shrubs.—Kew has lately received through Mr. J. C. Williams and Mr. A. K. Bulley a quantity of seeds collected in South-Western China by Mr. Forrest. The plant collector's work has always been attended with perils—sometimes of climatic, sometimes of human origin—but from what has been recounted in the public press of Mr. Forrest's adventures, we may judge that few indeed of the long line of plant collectors, which began with Francis Masson in 1772, have encountered more hardships and perils from both these agencies than Mr. Forrest. The country traversed by this intrepid collector is considerably to the south of that explored by Henry and Wilson, and the respective floras whilst presenting much the same general features are, no doubt, in many ways distinct. That of Mr. Forrest's country had in part been revealed by the work of some of the earlier Jesuit missionaries, notably by Abbé Delavay.

Among Mr. Forrest's seeds (of most of which the genus only is known), there is a considerable number of rhododendrons, ranging from low matted shrubs to trees 30 feet high. One of the latter, described as having large, pale yellow, fragrant flowers, is of exceptional interest. Will it provide us with the long-desired, yellow-flowered, hardy rhododendron with large leaves and trusses? All the yellow species we cultivate at present, with the exception of *R. campylocarpum*, are of a small Alpine type, and although

very pretty in their way, they are not robust and their charms are of a modest kind. Mr. Forrest describes this new one as growing in the rhododendron forest on the Tali range of mountains at 12,000–13,000 feet altitude. On the same range, at somewhat lower altitudes he obtained seed of two other yellow rhododendrons; these he describes as from 2 to 4 feet high, one with "bright yellow," the other with "deep yellow" flowers.

Of the remainder of the seeds the most interesting are two spruces, two firs, a larch and a cedar. Mr. Forrest seems somewhat doubtful as to the generic identity of the cedar, but we may hope that his estimate is correct. A new cedar would be a great acquisition and, with the deodar growing on the Himalayan ranges, the existence of one on the mountains northward seems at least probable. Maples and Cotoneasters are also in the collection. Unlike the cedars, of which we have still only three (or at most four) species, our gardens are already well stocked with these. All the conifers were collected by Mr. Forrest on the Lichiang range of mountains.

Botanical Magazine for April.—The plants figured are *Clematis aristata*, R. Br. var. *Dennisae*, W. R. Guilf. (t. 8367); *Pseuderanthemum malaccense*, Lindau (t. 8368); *Elaeagnus argentea*, Pursh (t. 8369); *Felicia petiolata*, N.E. Br. (t. 8370); and *Dendrobium muricatum*, Finet, var. *munificum*, Finet (t. 8371).

The Clematis which forms the subject of the first plate is a native of Victoria and is unusual in being a dioecious plant. It is also interesting and beautiful owing to the long salmon-red coloured anther filaments. This character in particular distinguishes the plant from any other form of *Clematis aristata*. Though the plant was probably discovered by von Mueller it was not until 1904 that it was brought to notice and cultivation by Mrs. Dennis of Murngal and Mr. Guilfoyle named it in her honour. It was sent to Messrs. Sander and Sons of St. Albans by Mr. Guilfoyle, and from them a plant was received at Kew which furnished the subject of the illustration.

Pseuderanthemum malaccense is a native of the Malay Peninsula and was sent to Kew by Mr. H. N. Ridley from the Singapore Botanic Gardens in 1908. The figure has been prepared from this plant which flowered at Kew in May, 1910. It is a handsome plant with violet flowers, the lower petal being sprinkled with red dots.

The Silver Berry (*Elaeagnus argentea*), is the solitary species of the genus found in North America, the others being natives of South-Eastern Asia and Japan. The leaves are covered by a close lepidote indumentum which gives them their peculiar metallic lustre.

Felicia petiolata is a pretty little Composite from Basutoland and the Albert division of Cape Colony. It was first found by Mr. T. Cooper in Basutoland in 1861, and was not again collected until 1903 when some ripe achenes were sent with herbarium specimens to Montpelier by Mr. Dieterlin. By this means the plant has been introduced to European gardens. The material for the plate was

supplied by Mr. W. E. Ledger, of Wimbledon, who sent specimens to Kew for identification. At Kew the plant flowers about midsummer.

The Dendrobium is a very remarkable plant, a native of New Caledonia. It differs from the type in the shape of the lip especially in the widely hastate-cordate anterior lobe. The plate was prepared from material received from the Royal Botanic Gardens, Glasnevin, where the plant, presented by Dr. Schlechter, flowered in 1909.

Prunus microcarpa, *C. A. Mey.*—Figures of this species in the flowering and fruiting state were recently published in the Botanical Magazine (tab. 8360). The flowers are represented as having a pink receptacle and calyx and a whitish-pink corolla, and the fruits as green. In the description the colour of the receptacle was given as "pubescens," of the petals as "albo-rosea vel alba," and of the fruit as "ruber vel luteus," whilst in the accompanying English text it was pointed out that the fruits in our climate are "liable to fall while still green." The plant from which the plate was prepared was acquired from Zoeschen. Since the publication of the plate in question Dr. G. Dieck of Zoeschen has kindly supplied some information concerning the plant which he recently received from Mr. R. Strauss, British Vice-consul at Sultanabad (Persia), together with coloured drawings made from wild specimens. According to Mr. Strauss the plant is a dwarf shrub in the neighbourhood of Sultanabad, but grows up to man's height on Kuh Perru (Luristan). The fruit, he says, sometimes reaches the size of a pea and has a sweetly-acid taste like a ripe sour-cherry. The figures represent the dwarf, rigidly divaricate form which corresponds to the *Cerasus diffusa* of Boissieu and Haussknecht such as I observed in the province of Farsistan. The receptacle is shown dark purplish-brown, the petals white and the fruits dark red; but as to the latter Mr. Strauss observes that there is also a variety with "fruits yellow as a Quince." These statements bear out the remarks made in the Botanical Magazine as to the variability of the plant, and it is only to be hoped that in normal summers and in situations with a maximum of available sunshine this pretty shrub may also be able to ripen its dainty fruits in our country.

O.S.

Cypripedium Thunbergii.—There is a handsome Japanese Cypripedium in cultivation whose correct name has been the subject of much uncertainty, though recent views have attributed it to *C. Thunbergii*, Blume. As the species has been figured for the Botanical Magazine and there was some doubt as to the correctness of this determination, application was made to the authorities of the Rijks Herbarium, Leiden, for the loan of the original specimen of *C. Thunbergii*. An examination and comparison of this specimen with other Japanese specimens and drawings shows that two very

distinct species have been confused. The object of the present note is to clear up this confusion so far as the materials available permit.

Cypripedium Calceolus, L., was enumerated by Thunberg as a Japanese plant in 1784 (Fl. Jap. p. 30) with the Japanese name "Atsmori so," and the brief record of locality "Crescit hinc inde." Blume in 1858 described this Japanese plant under the name of *C. Thunbergii* (Coll. Arch. Archip. Ind. et Jap. p. 169, t. 60, fig. 2), remarking that it differed from *C. Calceolus*, L., in the shape of the staminode and in the larger perianth segments. The description and figure were based upon a specimen cultivated at Jedo and preserved in the Herbarium at Leiden. The colour is not recorded, but the figure shows a staminode with acute basal angles, and a distinctly 5-lobed lip, the latter character quite anomalous in the genus.

Miquel, some ten years later, reduced *C. Thunbergii*, Blume, to *C. macranthum*, Sw. (Prolusio Fl. Jap. p. 142), but was not able to add anything to the history of the plant, having only seen the unique original specimen.

In 1876 Franchet and Savatier recorded the plant (Enum. Pl. Jap. ii. p. 40), as *C. macranthum* var. *β ventricosum*, Reichb. f., citing figures in two Japanese works, but giving no character. They, however, cite the Japanese name "Ats' mori so," and mention two Japanese localities.

In 1903 Pfitzer, in monographing the genus (Engl. Pflanzenreich, Arch. Pleon. p. 36), separated *C. Thunbergii*, Blume, giving *C. macranthum*, Franch. et Sav. nec Swartz, as a synonym, but he was only able to cite the original specimen at Leiden, repeating some of the details of Blume's figure.

In 1905 Matsumura (Index Pl. Jap. ii. p. 242), included the whole of the plants previously mentioned under *C. Thunbergii*, also *C. Calceolus* var. *Atsumori*, Morren (to which he gave no reference), and *C. macranthum* var. *ventricosum*, Reichb. f.

Lastly, the writer, in 1908 (Orch. Rev. xvi. p. 186), separated the Japanese plant from the Siberian *C. macranthum*, Swartz, but followed Matsumura in calling it *C. Thunbergii*, Blume, a view which now proves erroneous.

The plant which Matsumura calls *C. Calceolus* var. *Atsumori*, Morren, is clearly *C. Atsmori*, Morren, described and figured in 1851 (Belg. Hort. i. p. 171, t. 21, fig. 1), from a specimen which flowered at the Botanic Garden, Ghent, and which is said to have been received from Siebold among a number of other living plants from Japan, and its differences from *C. Calceolus*, L., and *C. cordigerum*, Don, were pointed out. It has narrower sepals and petals than *C. Thunbergii*, Blume, while the staminode is also narrower, and without the acute basal angle shown in the latter. Thus the identity of the two remains somewhat doubtful in the absence of more complete materials.

We now come to the two Japanese figures cited by Franchet and Savatier. So moku Zusetsu, xviii. t. 83, is a figure in black and white, labelled *C. macranthum*, Sw. It is said to be indigenous in Japan, but is very different from *C. Thunbergii*. Honzo Zufu, xxxix., t. 19, is a coloured figure of a quite different plant, and

may possibly represent *C. Thunbergii*, Blume. It is shown as an erect plant, with three leaves and a leaf-like bract, a solitary flower with brownish-yellow sepals and petals, and an oblong white tip tinged with pink beneath. The staminode is not represented, and the colouring of the lip is probably erroneous, for in the Japanese text the flower is described as " yellow " (as kindly deciphered by Mr. Takeda). On the other side of the same page, however (t. 18, recto) is a coloured plate of the macranthum-like species figured in So mokou Zusetsu, the colour being shown as white, with numerous rose-pink lines on the sepals and petals, and numerous rose-pink spots on the lip. The latter detail is probably erroneous, for otherwise it agrees well with the Japanese plant now in cultivation, and Mr. Takeda says that it represents the common Japanese species. This is the plant mentioned by Franchet and Savatier under *C. macranthum* as a doubtful species.

We have therefore evidence that two quite distinct plants are now confused under a single name, one being the common Japanese species, now erroneously called *C. Thunbergii*, the other the true *C. Thunbergii*, Blume, whose history is still very imperfectly known. Whether there is a third species is at present doubtful. The former apparently requires a new name. The following is the revised synonymy.

C. Thunbergii, *Blume*, Coll. Archip. Ind. et Jap. p. 169, t. 60, fig. 2 ; Pfitzer in Engl. Pflanzenreich, Arch. Pleon. p. 36, fig. 9 A, 16 D.

C. Calceolus, Thunb. Fl. Jap. p. 30. nec L.

C. macranthum, Miq. Prol. Fl. Jap. p. 142, nec Swartz.

? *C. Atsmori*, Morr. in Belg. Hort. i. p. 171, t. 21, fig. 1.

? Honzo Zufu, xxxix. t. 19.

Japan, without precise locality.

Only certainly known from Blume's original specimen. His figure of the lip is incorrectly drawn, the infolded angles of the side lobes, which are invariably included within the pouch in *Cypripedium*, being represented as a pair of free external lobes. The character is repeated by Pfitzer. The species seems to have been lost sight of ; perhaps the present note may lead to its rediscovery, and to the clearing up of the doubtful points respecting it. It seems most allied to *C. Calceolus*, L., and the Himalayan *C. cordigerum*, Don.

C. speciosum, *Rolfe* ; a *C. macrantho*, Swartz, floribus pallidis roseo-striatis et staminodio acutiore differt.

C. macranthum var. *ventricosum*, Franch. et Sav. Enum. Pl. Jap. ii. p. 40, excl. syn., nec Reichb. f. ; Matsumura, Nomencl. Pl. Jap., p. 63.

C. macranthos, Finet, in Bull. Soc. Bot. Fr. xlvii. p. 285, nec Swartz.

C. Thunbergii, Matsumura, Index Pl. Jap. ii. 242, excl. syn., nec Blume ; Rolfe in Orch. Rev., xvi. p. 186.

So mokou Zusetsu, xviii. t. 83 ; Honzo Zufu, xxxix. t. 18 (recto).

A common Japanese species, hitherto confused with the preceding and with the Siberian *C. macranthum*, Swartz, but differing from the latter in the colour of the flowers, which are white or pink veined with rose, and in some small details of floral structure. It

will be fully characterised in the Botanical Magazine, t. 8386. Both it and *C. macranthum* have been cultivated in quantity during recent years.

According to Matsumura, the species extends as far north as Urup, in the Kurile Islands, but I have not seen specimens from there or from the Island of Yezo. R. A. R.

A Forest Flora of Chota Nagpur.[1]—The area with which this work deals is that portion of the highland region of Central India which is included in the political province of Bengal. Mainly composed of the administrative division of Chota Nagpur with the tributary state of Gangpur on its south-western border, it also takes in a single district, that of the Santal Parganahs to the north-east, which belongs to another division. The addition of this last district is fully justified; it is an outlying one only in an administrative sense; topographically and botanically it forms an integral part of the upland country to the west of the lower and to the south of the upper portions of the great Gangetic Plain. The work, which has been drawn up primarily with reference to forest requirements, is directly benefited by the limitation of area which has been adopted, since it thereby includes practically the whole of the western forest divisions of Bengal. The addition of an excellent map enables the topographical features of the area to be readily understood and appreciably increases the usefulness of the book.

The author, who has lived much and travelled extensively within this tract of country, is on this account, as well as because of the long and careful study he has bestowed on its vegetation, well qualified to prepare a satisfactory flora. The introductory remarks are concise and well put, and satisfy the reader that he knows the region well and that he fully appreciates the factors which have decided the character of its vegetation. Unfortunately, departmental needs have debarred him from discussing fully those elements of the Flora which cannot be claimed as "economic." But for what he has given us we are grateful because we find, when the technical portion of the work is examined, that this is in no sense a compilation; it is clearly the result of careful and independent study, while the resulting views are stated with much judgment and caution.

The map, compiled by the Forest Survey and published by the Survey of India, sustains the reputation of these departments. The appearance of the book, however, is not attractive. But in spite of this drawback, this Forest Flora should form a useful companion to those residing in the area with which it deals who may be interested in its vegetation.

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[1] H. H. Haines: A Forest Flora of Chota Nagpur; pp. xxxvii +634, with a map: Calcutta, 1910.